IOSR Journal of Electronics and Communication Engineering (IOSR-JECE)
e-ISSN: 2278-2834,p- ISSN: 2278-8735.Volume 12, Issue 4, Ver. V (Jul.-Aug. 2017), PP 63-66
www.iosrjournals.org

Adaptive Resource Management Strategy with Multi– Service in Heterogeneous Networks

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Abstract: *Mobile communication has become fundamental for the human life; there is a thriving in the developed technologies. So, the operators are facing a lot of problems for the best uses of the different radio access technology (RATs) that they may have. In this paper, RAT selection algorithm based on four different Radio Access Technologies (RATs).These technologies coexist, namely [UMTS and LTE with Omni directional Antenna, GSM with three sectors and DCS with three sectors. Voice and data application are considered in the heterogeneous wireless networks.sumulation results show the improvement of the whole capacity, Qosand decreases the percentage of UN served users after applyingtheProposed Model.For common propagationmodel (free space). The paper is done via Mat lab tool which will be built based on a random distribution of the customer*

Keywords*: Radio Resource Management, Heterogeneous Wireless Networks, RAT Selection Algorithms, Quality of Service*

Date of Submission: 00-00-0000 Date of acceptance: 00-00-0000

I. Introduction

Nowadays, the phenomenon that "one network, one Application" is common to be seen in wireless communication networks. However, it has many drawbacks which will lead to more protocols used, lower usage of radio resource and more costs for networks operation and maintenance. Moreover, it is difficult to provide a variety of services across different networks [1,10]. Next generation wireless networks are visualized as a seamless, intelligent, cooperative and all IP heterogeneous systems, where multiple radio access technologies (RATs) coexist with different kind of mobile devices of various capabilities [2]. A major challenge arising from the heterogeneous network is the load balancing technique which can be viewed as one of the component elements of Radio Resource Management (RRM). There exist many organizations and standards that study the heterogeneous networks and have taken a load balancing into consideration. The 3GPP has put forward the 3GPP and Non3GPP access, where 3GPP access is about conventional cellular access technique and Non-3GPP access is about other access technique [3]. Moreover, IEEE has published the IEEE Std 1900.4-2009 whose purpose is toprogress overall built-up capacity and quality of service of wireless systems in a multiple RATs medium, by defining an appropriate system architecture and protocols that will facilitate the optimization of radio resource usage [4]. Load balancing gain in the heterogeneous system for background traffic is more difficult to quantify. The average delay can be minimized for background traffic, and the average throughput can be maximized, if the traffic is distributed equally between networks. It can be explained as follows: (1)If there exists a large many of users, load balancing mechanism can transfer some users in the overload network to the less loaded networks, which will enable two networks accept new arrivals. Thus, the system can serve more users, and it will help to improve the whole capacity [5]. (2)Take WLAN andcellular integrated networks as an example. WLAN uses a competitive mechanism and it will have more throughputs if the system is not saturated in contrast with saturated situation. So, if transferring some users from saturated WLAN to the cellular network, it will help to improve the whole capacity [6]. Load balancing is a key technique in heterogeneous networks for the purpose of optimizing of radio resource usage and improving the whole capacity. Load balancing has been widely applied in the area of machine production lines, exchange networks and computer distribution systems. However, the concept of load balancing in the heterogeneous networks has its own meanings. It is rooted from common radio resource management (CRRM) [7], and is proposed in 2005 and has been researching broadly in recent years. Some consider load balancing algorithms based only on a single

factor. Some consider only one service type. Some more complicated algorithms, which make decisions depending on multiple factors, are also studied in the literature [8]. Load balancing can be achieved through a proper RAT selection algorithm. Some paper achieves load balancing based on policy mechanism and uses determine statements [10].

II. Related work

Several networks co-located with several radio access technologies (RATs) work together mutual. Load balancing is one of the key techniques in heterogeneous networks which,can augmentthe whole capacity and quality of service (QoS) for the heterogeneous networks. [11]. in [12]-[13] the authors propose reputation-based load balancing network selection strategies for heterogeneous wireless surroundings. These standing -based mechanisms select the most convenient set of networks for the mobile user and a load balancing technique to disseminate the traffic load amidst the networks by making use of the different protocols, including TCP, UDP and Multipath TCP (MPTCP).In [14], Luo et al. propose a reinforcement –GrayRelativeAnalysis (S-GRA) access selection algorithm based on load balance in heterogeneous wireless networks.

III. System Parameters

Since the load balancing can be seen as a controlling problem, a proper controller could handle it. In heterogeneous networks, many parameters need to be taken into consideration, and radio resource is not the only target to be optimized. Meanwhile, the load balancing algorithm needs to take the presented system model parameters are summarized in Table (1). Some of These parameters are in consistent with the previously published work in These parameters are in consistence with the previously published work in [15,16].

lte Maximum Capacity (Cu max) (channels)	1200	lte Power Threshold (Prg min)	-100dbm
BTS/Node B antenna height (ht)	33 m	GSM900 Power Threshold (Prg min)	- 80 dbm
MS antenna height (hr)	1.5m	DCS1800 Power Threshold (Prd min)	- 80dbm
BTS/Node B antenna Gain (Gt)	18 dbi	UMTS Power Threshold (Pru min)	-90dbm
MS antenna Gain (Gr)	2 dbi	GSM900 Maximum Capacity (Cg max) (channels)	60
GSM900 central frequency (fg)	900 Mhz	DCS1800 Maximum Capacity (Cd max) (channels)	60
DCS1800 central frequency (fd)	1800 Mhz	UMTS Maximum Capacity (Cu max) (channels)	480
UMTS central frequency (fu)	2100 Mhz	BTS/Node B Transmitting Power Range (Pt)	-.96~6.19dbm
LTE central frequency (fl)	3000 Mhz		

Table (1)

IV. Simulation Results

In this section, numerical simulations are shown based on

The proposed model assumes that there are four different radio access technologies (RATs), GSM, DCS, UMTS and LTE. Applying free space propagation model, and random distribution of users will be done for operative transmitted power levels. The MRRM algorithm which taken for Load balance and Single service class is assumedFigure 1 and Figure 2 show the blocking and the dropping probabilities for the four RAT selection algorithms. Show the relation between the transmitted power and Capacity for heterogeneous wireless network for each network. Shows the relation between the transmittedpower and actual number of users served by each network. It can see by applying the load balancing algorithm for the four radio access technology (gsm,umts,Dcs and lte) it Improve the whole capacity of the costumers and 4G(LTE) support high capacity even with the low transmitted powerit served a high number of data and voice but doesdcs and gsm and umtsTheir fullness at the same transmitted power is nearly.Achieve minimal number of unserved customers.And Reduces network congestion

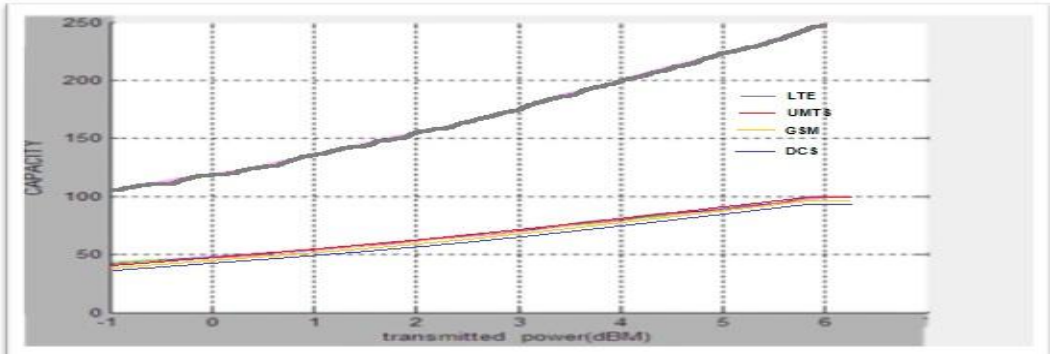

Fig -1 Capacity for heterogeneous wireless network vs Transmitted Power

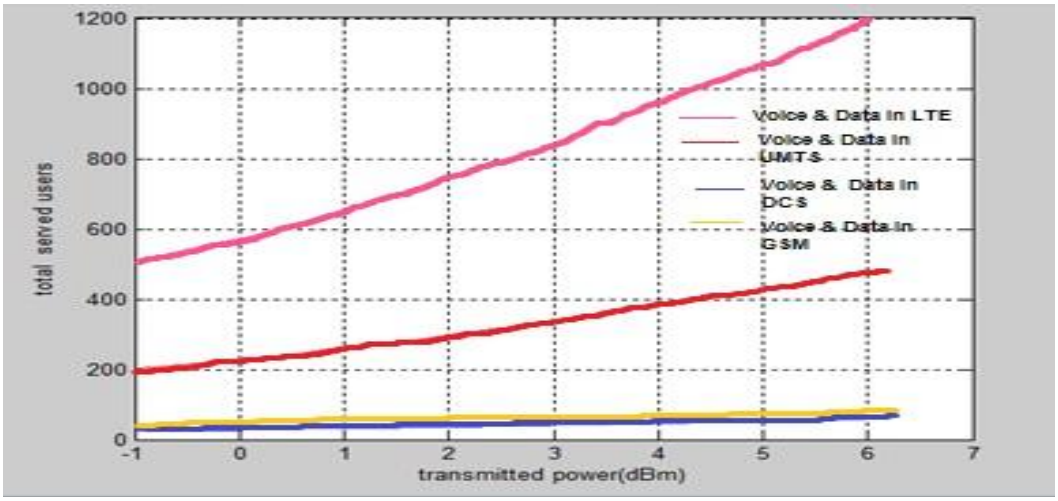

Fig -2 shows the relation between the transmitted power and actual number of users served by each network.

Fig-3 Transmitted Power (dbm) Vs percentage of un-served users shows the inverse

Transmitted Power (dbm) Vs percentage of un-served usersshows the inverse proportional between P_t and un-served customer (by increasing P_t causes increasing P_r and permit more customer to be served (i.e. decreasing un-served customer)

V. Conclusions

This paper evaluates the performance of load balancing Based on based on four different Radio Access Technologies (RATs).These technologies coexist, namely [UMTS and LTE with Omni directional Antenna, GSM with three sectors and DCS with three sectors. . Voice and data applications are considered to verify the performance ofthe proposed load balancing algorithm, and simulation results show that, in terms of utilization fairness, the radio resource management planning mechanism can balance the traffic load and then maximize the reward of the heterogeneous network system.

References

[1]. M. G. Chen and W. B. Wang, "The Principle and Application of Cooperative Wireless Communication", Mechanic industry Press.2009, pp.11-15.
[2]. G. T. Karetsos, S. A. KyriazakosA and E. Groustiotis, "A hierarchical radio resource management framework for integrating WLANs in cellular networking environments", IEEE press. 2005, pp.11.
[3]. System Architecture Evolution(release 8), 3GPP TS 36.401, 2009, pp.42.
[4]. IEEE Standard for Architectural Building Blocks Enabling NetworkDevice Distributed Decision Making for Optimized Radio Resource Usage in Heterogeneous Wireless Access Networks, IEEE Std 1900.4™-2009. 2009, pp.1.
[5]. G. Q. Ning and L. X. Zhu, "Load Balancing Based on Traffic Selection in Heterogeneous Overlapping Cellular Networks", IEEE press. 2005.
[6]. Y. Zhou and Y. X. Rong, "Utility Based Load balancing in WLAN/UMTS Internetworking Systems", IEEE press. 2008, pp.587-590.

[7]. L. Giupponi, R. Agusti, J. P. Romero and O. Sallent. "A Novel Joint Radio Resource Management Approach with Reinforcement Learning Mechanisms", IEEE press. 2005, pp.621-626.
[8]. L. J. Wu, A. E. AL Sabbagh, K. Sandrasegaran, M. Elkashlan and C. C. Lin, "Performance Evaluation on Common Radio Resource Management Algorithms", IEEE press. 2010, pp.491-495.
[9]. R. Yavatkar, D. Pendarakis and R. Guerin, "A Framework for Policy Based Admission Control", RFC 2753. 2000.
[10]. Sun Jin, Wu Xuanli, ShaXuejun (Load Balancing Algorithm with Multi-Service in Heterogeneous Wireless Networks) in 2011 6th International ICST Conference on Communications and Networking in China (CHINACOM) pp.703-707,2011
[11]. MatteoAnedda*, Gabriel-MiroMuntean, Maurizio Murroni, (Adaptive Real-time Multi-user Access Network SelectionAlgorithm for Load-balancing over HeterogeneousWireless Networks)IEEE journal on selected areas in communications,vol.38,no.2 ,pp1-4.,2016
[12]. T. Bi, R. Trestian, and G.-M. Muntean, "RLoad: Reputation-based load-balancing network selection strategy for heterogeneous wireless environments," IEEE International Conference on Network Protocols (ICNP), Göttingen, Germany,vol pp. 1–3,2013.
[13]. T. Bi, R. Trestian, and G.-M. Muntean, "Reputation-based Network Selection Solution for Improved Video Delivery Quality in Heterogeneous Wireless Network Environments", IEEE BMSB, London, UK, pp. 1-6 , June 2013
[14]. Y. Luo, B. Qi, Y. Chen, and L. Tang, "Strengthen-Gray Relative Analysis access selection algorithm based on load balance in heterogeneous wireless networks," in 2012 Eighth International Conference on Natural Computation (ICNC), pp. 843–847, 2012.
[15]. Leijia Wu; Sabbagh, A.; Sandrasegaran, K.; Elkashlan, M.; Cheng-Chung Lin, "Performance Evaluation on Common Radio Resource Management Algorithms", Advanced Information Networking and Applications Workshops (WAINA), 2010 IEEE 24th International Conference, August 2010, pp. 491 -495.
[16]. Amitava Mukherjee, DebashisSaha " Approaches for radio resource management in mobile wireless networks: current status and future issues" UNSW computer science and engineering technical reports, 1448-420X; UNSW-CSE-0404, 2004.

Eman Gaber Ahmed Mahmud. "Adaptive Resource Management Strategy with Multi– Service in Heterogeneous Networks." IOSR Journal of Business and Management (IOSR-JBM) , vol. 19, no. 9, 2017, pp. 63-66.